

Kuipers & Associates

Sarah Zuzulock, PE

Senior Environmental Engineer PO Box 1859

szuzulock@kuipersassoc.com Bozeman, MT 59771

Phone: (406)585-9932

Fax: (406)585-9889

Kuipers & Associates, LLC

Date: January 18, 2009

To: Anaconda Deer Lodge County

From: Kuipers & Associates

Subject: **Ambient Air Quality Monitoring
Opportunity and Warm Springs Sites
December 2008 Monthly Report**

This December 2008 report documents the ambient air quality monitoring program conducted by Kuipers & Associates on behalf of Anaconda Deer Lodge County at the Opportunity and Warm Springs locations adjacent to the Atlantic Richfield Lower Waste Management Area. Total Suspended Particulate (TSP) is monitored at Opportunity, and PM10 at Warm Springs. Additionally, wind speed, wind direction, temperature and relative humidity are monitored at both sites.

Pyrex dishes have been in place since August 15, 2008 at both sites to capture settling dust. The dust is being collected onto filters using a personal sampling pump, in conjunction with twice-weekly site visits. The first set of preliminary results was reported in the November 2008 monthly report. A second set of samples was submitted for analysis in December 2008.

Additional sampling using dustfall jars was implemented on October 17, 2008. The first set of preliminary results was obtained in late December 2008, and is currently under review.

All data, discussion and conclusions provided in this report are preliminary and will undergo a complete quality assurance review prior to issuance of final results in quarterly and annual reports in accordance with the project Sampling and Analysis Plan. Results for the month are summarized as follows:

- Hourly average data were collected continuously by the monitors from December 1st through December 31st, with 95.6% availability for TSP at the Opportunity location and 85.5% availability for PM10 at the Warm Springs location.
 - Downtime at the Opportunity location occurred on December 1 at 15:00 MST, on December 22 at 16:00 MST, and on December 26 at 15:00 MST for monthly calibration checks and routine maintenance. Downtime associated with a power outage occurred on December 29 at 18:00 MST.
 - Additional downtime occurred at Opportunity because of extreme cold temperatures that exceeded the lower operating limit (-30°C) of the air monitor. The periods included December 15 from 04:00 MST through 09:00 MST, December 16 from 01:00 MST through 09:00 MST, December 16 from 22:00 MST through 23:00 MST, December 20 from 00:00 through 09:00 MST, and December 20 at 20:00 and 23:00 MST.

- Downtime at the Warm Springs location occurred on December 1 at 14:00 MST, on December 22 at 15:00 MST, on December 26 at 14:00 MST, and on December 29 at 16:00 MST for monthly calibration checks and routine maintenance. Downtime associated with power outages occurred on December 2 at 15:00 MST, and from December 29 at 18:00 MST through December 30 at 13:00 MST.
 - Additional downtime occurred at Warm Springs because of extreme cold temperatures that exceeded the lower operating limit (-30°C) of the air monitor. The periods included December 13 from 18:00 MST through December 14 at 11:00 MST, December 14 from 18:00 MST through December 15 at 11:00 MST, December 15 from 20:00 MST through December 16 at 11:00 MST, December 16 from 18:00 MST through December 17 at 05:00 MST, December 19 from 23:00 MST through December 20 at 10:00 MST, and December 20 from 18:00 MST through December 21 at 00:00 MST.
- The hourly average data record for the month is attached. Current data is available for real-time electronic download on demand, and public viewing at:
<http://ka.airsis.com/vision/login.aspx?ReturnUrl=%2fvision%2fDefault.aspx> (Username = ADLC, Password = OCPA).
- At the Opportunity location the maximum TSP reading for the period on a daily average basis was 175 $\mu\text{g}/\text{m}^3$, and the average monthly concentration for December was 14 $\mu\text{g}/\text{m}^3$. The maximum reading for the period on an hourly average basis was 1,174 $\mu\text{g}/\text{m}^3$. This value was associated with strong northerly winds. The four highest daily and hourly maximum values are summarized in Table 1, and the average daily data for the month is attached together with meteorological information in Table 3.
- At the Warm Springs location the maximum PM10 reading for the period on a daily average basis was 193 $\mu\text{g}/\text{m}^3$. However, this daily average was based on only 17 hourly readings, as the sampler stopped operating due to the ambient temperature falling below its operating limit of -30°C. The average monthly concentration for December was 9 $\mu\text{g}/\text{m}^3$. The maximum reading for the period on an hourly average basis was 1,136 $\mu\text{g}/\text{m}^3$. This value also was associated with strong northerly winds. The four highest daily and hourly maximum values are summarized in Table 2, and the average daily data for the month is attached together with meteorological information in Table 4.
- The sampling tapes for both sites were inspected, and very distinct, dark dots were noted corresponding with the high concentration periods – which occurred simultaneously at both sites during strong northerly winds. This indicates a regional dust event not specifically associated with the Opportunity tailings area, since the Warm Springs monitor was upwind at that time.

Table 1
Opportunity Site TSP Maximum Data, December 2008

Maximum	TSP ($\mu\text{g}/\text{m}^3$)	Date & Time (MST)	Wind Speed (mph)	Wind Direction (deg)
Daily 1st Max	175	12/13/2008	12.5	358
Daily 2nd Max	33	12/21/2008	9.5	153
Daily 3rd Max	25	12/14/2008	4.9	107
Daily 4th Max	23	12/27/2008	9.9	221
Hourly 1st Max	1,174	12/13/2008 11:00	17.0	5
Hourly 2nd Max	526	12/13/2008 12:00	18.3	4
Hourly 3rd Max	499	12/13/2008 5:00	16.6	352
Hourly 4th Max	339	12/13/2008 10:00	17.4	358

Table 2
Warm Springs Site PM10 Maximum Data, December 2008

Maximum	PM10 ($\mu\text{g}/\text{m}^3$)	Date & Time (MST)	Wind Speed (mph)	Wind Direction (deg)
Daily 1st Max	193	12/13/2008	8.8	339
Daily 2nd Max	26	12/17/2008	8.1	180
Daily 3rd Max	19	12/19/2008	2.4	31
Daily 4th Max	15	12/27/2008	12.3	180
Hourly 1st Max	1,136	12/13/2008 5:00	14.3	331
Hourly 2nd Max	482	12/13/2008 12:00	11.2	350
Hourly 3rd Max	379	12/13/2008 11:00	10.1	356
Hourly 4th Max	353	12/13/2008 6:00	13.9	329

- There are no Montana or Federal air quality standards for TSP; both were replaced by the current PM10 standard in 1987. Prior to 1987 the Montana annual TSP standard was $75 \mu\text{g}/\text{m}^3$, the 24-hour standard was $200 \mu\text{g}/\text{m}^3$ and there was no hourly standard. TSP results for December at Opportunity were below these historical standards. Monitoring for PM10 from May 2007 through June of 2008 showed that PM10 concentrations were consistently below regulatory levels. To facilitate comparison with previously collected PM10 data, the TSP data are being reported at Local temperature and pressure conditions.
- At the Warm Springs monitoring site daily average PM10 results for the month of December showed one exceedance ($193 \mu\text{g}/\text{m}^3$ on December 13) of the 24-hour Montana Ambient Air Quality Standard of $150 \mu\text{g}/\text{m}^3$. However, the daily average was based on only 17 hourly readings, and it is suspected that readings during the last 7 hours of the day were much lower based on the wind data and concentration trends observed at Opportunity. The average monthly concentration was below the annual PM10 standard of $50 \mu\text{g}/\text{m}^3$. There currently is no State or Federal standard for hourly PM10 data.
- Precipitation for the month was above normal according to Butte airport records.
- Wind roses are attached to graphically depict prevailing winds.
 - Figure 1 shows the Opportunity location, where the predominant wind directions in December were from the south-southeast through west-southwest quadrant.

- Figure 2 shows the Warm Springs location, where the predominant wind directions were southerly.
- If a dust storm event or nuisance dust in general is observed, please contact us so that we may respond, and try to quantify and document the problem. We are available seven days per week 24 hours per day and ask that you contact the following (in order) until someone is notified.

Dust Event Contacts:

Steve Heck 498-4199

David Dobrinien 563-7474, then 490-9205

Jim Kuipers 782-3441, then 459-0445

Sarah Zuzulock 585-9932, then 581-1355

Table 3
Opportunity Site Daily Average Data

Date	TSP Daily ($\mu\text{g}/\text{m}^3$)	Wind Speed Daily (meters per second)	Wind Speed Daily (miles per hour)	Wind Direction Daily (degrees true)	Air Temperature Daily (Celsius)	Air Temperature Daily (Fahrenheit)	Relative Humidity Daily (percent)
December 1, 2008	1	2.5	5.5	211	5.5	42.0	60
December 2, 2008	12	3.4	7.5	290	2.0	35.5	66
December 3, 2008	5	1.1	2.4	18	-8.1	17.4	72
December 4, 2008	8	2.0	4.5	136	-10.5	13.0	64
December 5, 2008	4	2.9	6.5	241	-0.9	30.5	51
December 6, 2008	3	1.8	4.1	230	4.9	40.9	51
December 7, 2008	8	3.1	6.9	249	3.7	38.7	49
December 8, 2008	8	1.2	2.7	296	-5.3	22.4	82
December 9, 2008	2	3.4	7.5	235	-1.6	29.2	56
December 10, 2008	0	2.8	6.3	250	3.9	39.0	59
December 11, 2008	2	2.3	5.2	281	1.3	34.3	53
December 12, 2008	3	2.2	4.9	191	-1.3	29.6	56
December 13, 2008	175	5.6	12.5	358	-17.9	-0.2	65
December 14, 2008	25	2.2	4.9	107	-25.7	-14.2	56
December 15, 2008	11	1.6	3.5	162	-26.5	-15.8	55
December 16, 2008	13	0.7	1.5	205	-26.6	-15.9	58
December 17, 2008	11	3.0	6.8	198	-12.0	10.4	54
December 18, 2008	7	2.7	6.0	154	-7.1	19.3	52
December 19, 2008	16	1.4	3.1	348	-14.9	5.3	77
December 20, 2008	10	0.7	1.7	196	-26.5	-15.7	69
December 21, 2008	33	4.2	9.5	153	-12.3	9.9	63
December 22, 2008	8	2.0	4.6	93	-11.0	12.3	75
December 23, 2008	6	0.8	1.8	345	-14.9	5.2	76
December 24, 2008	5	2.5	5.6	173	-9.4	15.0	59
December 25, 2008	14	2.3	5.1	26	-4.0	24.8	70
December 26, 2008	0	2.1	4.7	271	-8.7	16.4	61
December 27, 2008	23	4.4	9.9	221	-3.7	25.3	60
December 28, 2008	6	3.7	8.2	220	1.6	34.9	73
December 29, 2008	15	2.8	6.2	260	-0.3	31.5	81
December 30, 2008	-1	2.2	4.8	231	-6.4	20.5	59
December 31, 2008	10	4.7	10.6	229	-1.2	29.8	62

Table 4
Warm Springs Site Daily Average Data

Date	PM10 Daily ($\mu\text{g}/\text{m}^3$)	Wind Speed Daily (meters per second)	Wind Speed Daily (miles per hour)	Wind Direction Daily (degrees true)	Air Temperature Daily (Celsius)	Air Temperature Daily (Fahrenheit)	Relative Humidity Daily (percent)
December 1, 2008	1	3.1	6.8	190	6.4	43.6	57
December 2, 2008	4	2.3	5.0	275	1.5	34.7	70
December 3, 2008	1	0.9	2.1	6	-9.1	15.6	74
December 4, 2008	1	1.3	2.9	11	-11.5	11.2	65
December 5, 2008	1	1.6	3.6	283	-3.4	25.9	61
December 6, 2008	3	2.0	4.6	200	5.0	40.9	51
December 7, 2008	0	2.8	6.3	223	3.9	39.0	49
December 8, 2008	7	1.3	3.0	306	-6.0	21.3	82
December 9, 2008	-1	3.3	7.5	214	-1.4	29.5	57
December 10, 2008	-1	2.8	6.4	217	3.6	38.5	61
December 11, 2008	0	1.6	3.5	281	-0.7	30.8	61
December 12, 2008	-1	3.7	8.2	170	-0.6	30.9	52
December 13, 2008	193	3.9	8.8	339	-19.8	-3.7	64
December 14, 2008	14	1.0	2.3	359	-28.9	-20.0	47
December 15, 2008	10	1.2	2.6	190	-28.5	-19.3	50
December 16, 2008	9	0.6	1.3	266	-26.4	-19.1	49
December 17, 2008	26	3.6	8.1	180	-13.7	7.4	50
December 18, 2008	0	3.5	7.9	168	-6.6	20.1	48
December 19, 2008	19	1.1	2.4	31	-16.4	2.5	77
December 20, 2008	6	0.6	1.4	140	-27.7	-17.9	68
December 21, 2008	1	3.4	7.7	144	-13.7	7.3	63
December 22, 2008	7	1.6	3.5	190	-11.6	11.1	73
December 23, 2008	2	0.6	1.4	38	-14.9	5.2	75
December 24, 2008	2	3.2	7.1	159	-10.2	13.6	59
December 25, 2008	11	2.2	4.9	121	-3.3	26.2	70
December 26, 2008	-3	1.2	2.6	218	-9.2	15.5	66
December 27, 2008	15	5.5	12.3	180	-2.9	26.8	60
December 28, 2008	2	4.8	10.8	183	2.7	36.8	72
December 29, 2008	2	3.8	8.5	190	1.4	34.5	81
December 30, 2008	-3	1.8	4.1	202	-6.8	19.7	59
December 31, 2008	8	5.5	12.3	212	-0.6	31.0	62

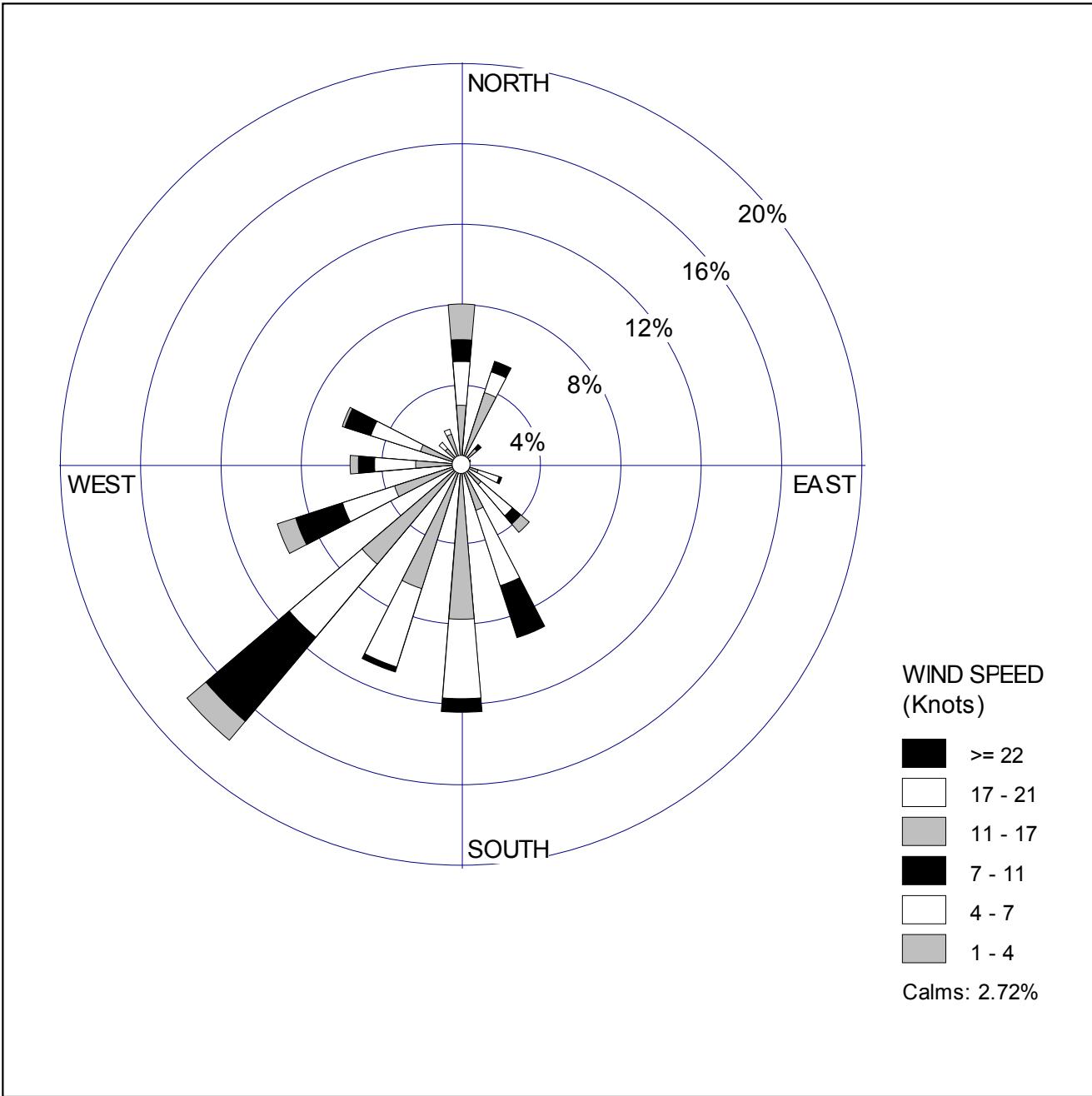


Figure 1. Wind Rose (percent of time blowing from indicated direction) for Opportunity EBAM Site December 2008.

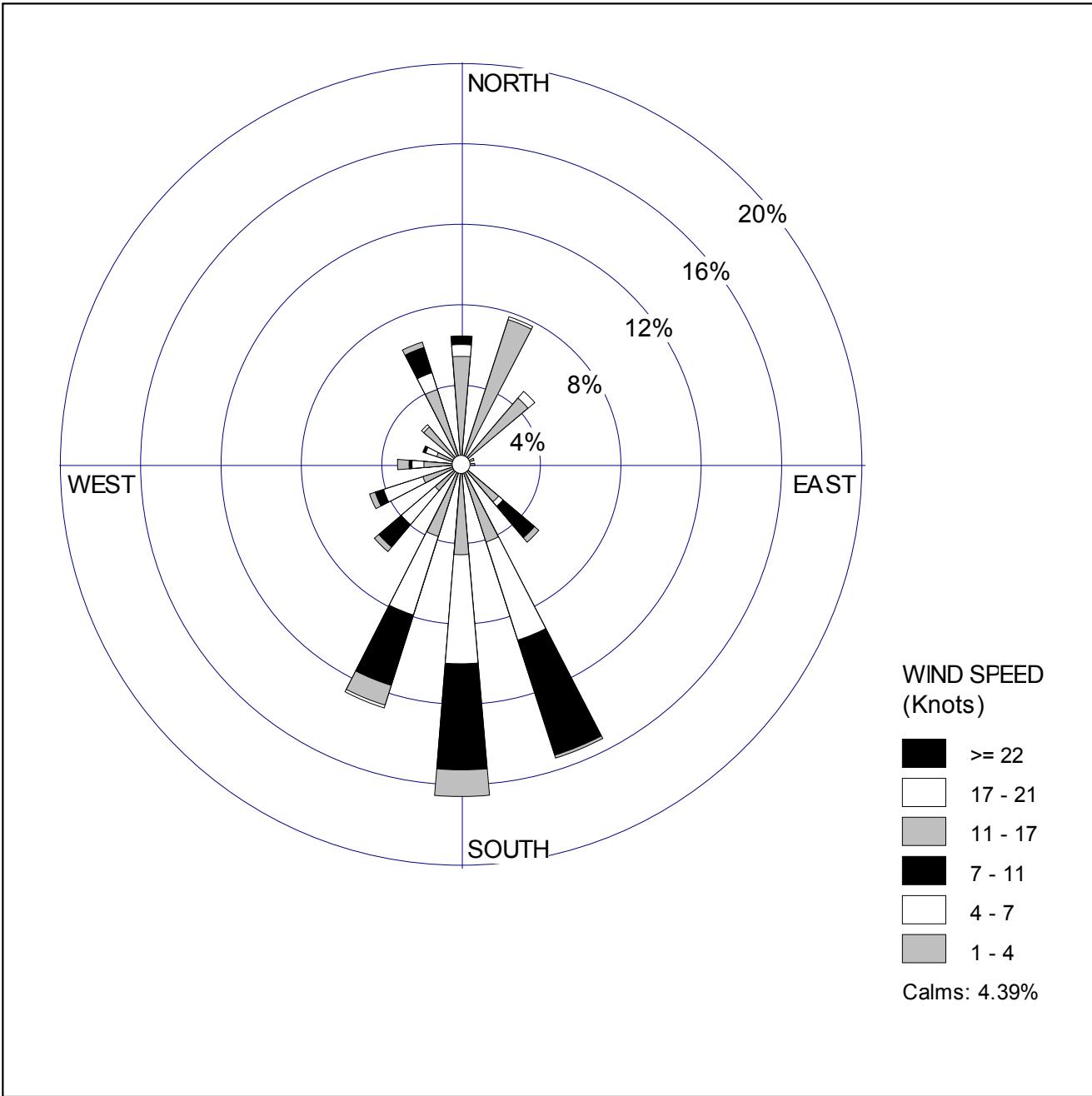


Figure 2. Wind Rose (percent of time blowing from indicated direction) for Warm Springs EBAM Site December 2008.

Date & Time Mountain Standard Time (data for hour ending)	TSP Hourly (µg/m³)	Wind Speed Hourly (meters per second)	Wind Speed Hourly (miles per hour)	Wind Direction Hourly (degrees true)	Air Temperature Hourly (Celsius)	Air Temperature Hourly (Fahrenheit)	Relative Humidity Hourly (percent)
12/30/2008 22:00	-2	2.1	4.7	198	-9.4	15.1	64
12/30/2008 23:00	-5	2.5	5.6	207	-8.3	17.1	62
12/31/2008 0:00	-5	3.9	8.7	162	-6.5	20.3	57
12/31/2008 1:00	-2	3.8	8.5	160	-5.2	22.6	58
12/31/2008 2:00	-1	4.0	8.9	158	-4.3	24.3	56
12/31/2008 3:00	2	3.3	7.4	159	-4.7	23.5	57
12/31/2008 4:00	16	3.5	7.8	175	-3.7	25.3	62
12/31/2008 5:00	3	4.0	8.9	170	-3.5	25.7	58
12/31/2008 6:00	0	3.4	7.6	172	-3.2	26.2	59
12/31/2008 7:00	4	3.8	8.5	174	-2.3	27.9	60
12/31/2008 8:00	7	3.8	8.5	181	-2.3	27.9	63
12/31/2008 9:00	3	3.7	8.3	204	-2.1	28.2	66
12/31/2008 10:00	2	4.0	8.9	207	-0.9	30.4	62
12/31/2008 11:00	-1	4.2	9.4	214	0.7	33.3	58
12/31/2008 12:00	59	6.0	13.4	224	1.5	34.7	59
12/31/2008 13:00	8	6.6	14.8	228	1.7	35.1	62
12/31/2008 14:00	29	7.9	17.7	235	1.7	35.1	67
12/31/2008 15:00	3	6.6	14.8	237	1.5	34.7	69
12/31/2008 16:00	6	6.2	13.9	267	1.5	34.7	68
12/31/2008 17:00	43	4.9	11.0	287	0.0	32.0	76
12/31/2008 18:00	1	4.7	10.5	247	0.7	33.3	61
12/31/2008 19:00	13	4.5	10.1	242	0.8	33.4	52
12/31/2008 20:00	-5	8.0	17.9	266	0.3	32.5	51
12/31/2008 21:00	14	7.4	16.6	269	-0.9	30.4	61
12/31/2008 22:00	4	2.8	6.3	281	-1.7	28.9	67
12/31/2008 23:00	38	3.0	6.7	281	-1.5	29.3	64
1/1/2009 0:00	-5	3.7	8.3	298	-3.1	26.4	76

AO = Bad weather

AV = Power outage

BA = Routine maintenance / repairs

Date & Time Mountain Standard Time (data for hour ending)	PM10 Hourly (µg/m³)	Wind Speed Hourly (meters per second)	Wind Speed Hourly (miles per hour)	Wind Direction Hourly (degrees true)	Air Temperature Hourly (Celsius)	Air Temperature Hourly (Fahrenheit)	Relative Humidity Hourly (percent)
12/30/2008 22:00	-5	3.0	6.7	225	-8.7	16.3	61
12/30/2008 23:00	-3	3.4	7.6	217	-7.0	19.4	58
12/31/2008 0:00	3	2.9	6.5	180	-5.1	22.8	55
12/31/2008 1:00	-5	3.4	7.6	168	-3.9	25.0	54
12/31/2008 2:00	0	4.2	9.4	156	-3.1	26.4	54
12/31/2008 3:00	-5	3.6	8.1	162	-2.6	27.3	56
12/31/2008 4:00	-3	4.1	9.2	184	-1.9	28.6	59
12/31/2008 5:00	-1	5.2	11.6	169	-1.7	28.9	60
12/31/2008 6:00	7	5.2	11.6	172	-1.1	30.0	59
12/31/2008 7:00	-5	5.4	12.1	169	-0.8	30.6	56
12/31/2008 8:00	1	5.7	12.8	158	-1.0	30.2	57
12/31/2008 9:00	-5	6.1	13.6	165	-1.3	29.7	63
12/31/2008 10:00	1	5.5	12.3	181	-0.3	31.5	60
12/31/2008 11:00	7	8.1	18.1	197	1.4	34.5	57
12/31/2008 12:00	5	8.7	19.5	205	2.0	35.6	56
12/31/2008 13:00	0	7.8	17.4	204	2.5	36.5	58
12/31/2008 14:00	-4	7.3	16.3	217	2.4	36.3	63
12/31/2008 15:00	-5	5.8	13.0	227	1.7	35.1	67
12/31/2008 16:00	74	6.6	14.8	245	1.1	34.0	73
12/31/2008 17:00	86	6.7	15.0	266	-0.4	31.3	83
12/31/2008 18:00	-3	5.8	13.0	253	0.3	32.5	65
12/31/2008 19:00	0	5.8	13.0	259	0.7	33.3	53
12/31/2008 20:00	10	7.4	16.6	270	-0.1	31.8	56
12/31/2008 21:00	8	6.3	14.1	271	-0.2	31.6	52
12/31/2008 22:00	7	3.9	8.7	265	-1.4	29.5	65
12/31/2008 23:00	22	2.7	6.0	302	-2.2	28.0	76
1/1/2009 0:00	7	0.7	1.6	18	-3.4	25.9	80

AO = Bad Weather

AV = Power outage

BA = Routine maintenance / repairs